



Wisconsin Department of Transportation

Land Information Integration and Modernization Plan

April 2012

**Wisconsin Department of Transportation Plan to
Integrate and Modernize Land Information**

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Table of Contents

EXECUTIVE SUMMARY	4
AGENCY IDENTIFICATION AND PLAN COORDINATOR	4
CONTACT PERSON	4
PLAN SUMMARY	4
CHALLENGES	8
THE FIVE TECHNOLOGY ARCHITECTURES	9
APPLICATIONS ARCHITECTURE	9
INFORMATION ARCHITECTURE	11
CUSTODIAL RESPONSIBILITIES	12
DATA SHARING AGREEMENTS	13
MAJOR DATASETS	13
METADATA SOFTWARE	14
WISDOT METADATA/LAND INFORMATION AVAILABLE ON THE WEB	15
FUTURE METADATA PLANS	16
TECHNOLOGY ARCHITECTURE	16
HARDWARE	16
SOFTWARE	16
ORGANIZATIONAL ARCHITECTURE	17
GIS RELATED TRAINING OFFERED	17
EXISTING DATASHARING AGREEMENTS	17
SECURITY ARCHITECTURE	18
LEGAL DISCLAIMER	18
OPEN RECORDS	18
COST RECOVERY	19
APPENDIX A	20

I. Executive Summary

A. Agency Identification and Plan Coordinator

According to §16.967(6), Wis. Stats., the Wisconsin Department of Transportation (WisDOT) is required to annually submit its Land Information Integration and Modernization Plan (LIIMP). This Plan's purpose is to enable such information to be readily translatable, retrievable and geographically referenced for use by any state, local governmental unit or public utility.

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B. Contact Persons

See section A. above.

C. Plan Summary

This Plan provides detail about land/geographic information systems within WisDOT. This detail is organized according to the five main architectures (components) of a land information system. Within each component, the plan describes the status of that component as it relates to land information/ Geographic Information Systems (GIS) at WisDOT, outlines key strategies being implemented to achieve WisDOT's land information vision and goals, describes challenges to achieving those goals, and identifies where assistance from outside groups would be helpful in achieving those goals.

The five architectures are:

- Applications
- Information
- Organization
- Technology
- Security

WisDOT's Vision for Land Information

Provide readily translatable, retrievable, geographically referenced, publicly accessible, transportation-related land information to the extent feasible, for use by WisDOT managers and staff, other state agencies, local governments, public utilities, and the general public in order to meet land information planning and decision-making needs.

WisDOT's Land Information Goals

The goals of this plan are, through the increased use of land information and GIS tools and applications, to:

- Reduce duplication of effort across all levels of government
- Improve analysis, planning, decision-making, and administration by government and the private sector.

WisDOT's Land Information Objectives

In order to achieve this Plan's vision and goals, WisDOT adopted the following objectives:

- Increase the use of GIS tools and applications where appropriate and cost-effective.
- Provide access to land information both within WisDOT by WisDOT staff and with local governments, regional planning commissions, state agencies and the private sector.
- Improve the integration of land information both within WisDOT and with local governments, regional planning commissions, state agencies and the private sector.
- Improve organizational support for GIS to improve efficiencies and avoid duplication.
- Incorporate location information, where appropriate and feasible, into existing and new databases and applications.

- Improve integration of new spatial databases with existing and planned applications.
- Continue work on custodial responsibilities.
- Encourage use of land information, when appropriate, by WisDOT staff.

Key examples of Strategies to Achieve Land Information Vision, Goals and Objectives

- Increase the use of GIS tools and applications where appropriate and cost-effective.
 - IT and GIS development, support and maintenance are now consolidated within the Department for greater efficiency. All major GIS activities within these frameworks are now coordinated through the Bureau of Information Technology Services.
 - WisDOT GIS staff actively participates with other agencies and organizations, and to the extent possible coordinates activities with outside agencies.
 - Corporate GIS projects are reviewed to reduce duplication and improve interoperability.
- Provide easy access to land information both within WisDOT by WisDOT staff and with local governments, regional planning commissions, state agencies and the private sector, with a focus on providing information needed by local governments to develop comprehensive plans.
 - WisDOT has actively participated in multiple, interagency committees and taskforces related to land information efforts.
 - WisDOT developed and provided – at Department of Administration request – a comprehensive planning data matrix of WisDOT data holdings that may be useful to local governments developing a comprehensive plan under §66.1001. The matrix provides metadata (condensed version) about each land information-related database, report & plan.
 - WisDOT, in conjunction with local officials, developed an Internet and GIS-based Information System called the Wisconsin Information System for Local Roads (WISLR), to facilitate management of the 100,000+ miles of local roads in the state. Through WISLR, information such as pavement condition rating, road width and length, shoulder information, number of lanes, pavement type, construction year, functional classification, etc. is readily available. WISLR also allows the user to display data geographically (i.e. view data on a map), print reports and maps, and edit/update data instantly.
 - WisDOT collects and maintains information about the State Trunk Network (STN). The STN is a collection of State, Interstate, and National Highways that support the Roadway Infrastructure within the State of Wisconsin. These roadways must be maintained, analyzed, inventoried, and reported upon. The collected information is used in various decision-making processes in conjunction with WisDOT's budgets, the budgets of

- county and local municipalities, other state and federal agencies, and the state legislature.
 - The Modal and GIS Production Support Unit functions as a geospatial data broker for WisDOT and individuals, businesses, and agencies seeking to acquire transportation-related information.
- Increase the integration of land information both within WisDOT and between WisDOT and local governments, regional planning commissions, state agencies and the private sector, with a focus on providing information needed by local governments to develop comprehensive land use plans.
 - WisDOT's Data Modeling Policy states that data that is shared between workgroups must be modeled and its data model will be included in the WisDOT Corporate Data Model. Location Control Management (LCM) data is an example of how this policy reduces redundancy and increases sharing by providing a common framework and data sets that can be reused by new business applications.
 - WisDOT's Oversize/Overweight Permitting system links various systems that retrieve customer and vehicle information, evaluates time-related and physical restrictions, performs bridge structural analysis, and generates a route. The results consist of route and escort instructions, trip conditions, restricted bridges, and maps that are appended to the permit for the motor carrier's use during the trip. The automated routing permit increases public safety by optimizing routes. The project improves customer service because of the faster turnaround time on permit applications and reduces downtime costs for motor carriers.
- Improve organizational support for GIS, to improve efficiencies and avoid duplication.
 - The WisDOT Board of Directors provides guidance and management oversight for Information Technology within WisDOT. Made up of the Secretary, Deputy Secretary, EA, heads of each of the 2 Offices, all division Administrators and Deputies, and the DSP superintendent and deputy, the Board of Directors provides IT planning and management oversight. The Bureau of Information Technology Services (BITS) supports the Board's activities. GIS utilization within WisDOT IT projects is identified during project planning.
 - GIS-specific policies, standards and guidelines are created to complement broader WisDOT information technology policies, standards and guidelines.
- Incorporate location information, where appropriate and feasible, into existing and new databases and applications.
 - WisDOT-developed WISLR (described above) allows the user to display data geographically (i.e. on a map), print reports and maps, and edit/update data instantly.

- The Highway Access Management System utilizes a GIS interactive web-mapping interface to provide location-based search and retrieval of access controls information for Real Estate, Planning, and Permitting areas within WisDOT Regions.
- Financial Integrated Improvement Programming System (FIIPS) is the department's comprehensive system for the advance planning, short term planning and management of local and state trunk improvement programs. FIIPS uses GIS for project location and initial data entry for some location data, generation of the concept definition report map, and supports analysis of the improvement program by geographic jurisdictions.
- Improve integration of new spatial databases with existing and planned applications.
 - WisDOT's Oversize/Overweight permit application and WISLR (described above) are examples of integrating applications and information between new and existing information (data) and new and existing applications.
 - The Photolog/GPS project tied WisDOT's Photolog images and indexes to WisDOT's corporate Location Referencing System (LRS). This allows data collected or stored with a Photolog reference to be integrated with other corporate data.
- WisDOT has custodial responsibilities for certain data, either by statute or to fulfill business needs. WisDOT will continue to fulfill those custodial responsibilities, including making them available to the public as required by law.
 - WisDOT has several custodial datasets currently available online, and will continue to make them available.
 - Accuracy is vital to the proper design and engineering of transportation projects. The High Accuracy Reference Network (HARN) is a network of almost 100 concrete monuments spaced throughout the state. WisDOT sends the precise horizontal position (latitude and longitude) of these monuments to the National Geodetic Survey (NGS), which publishes them on an Internet site.
 - The Wisconsin Height Modernization Program (WI-HMP) focus is to increase the HARN for horizontal control and add accurate vertical values to the monuments. When complete, over 9000 monuments will be established. Like the HARN, this is a network of monuments with a spacing of about 6 kilometers throughout the state. As with the HARN, the horizontal and vertical positions of these monuments are published on an Internet web site of the NGS.
 - The State Trunk Network (STN) is the collection of State, Interstate, and National Highways in Wisconsin. These roadways must be maintained, analyzed, inventoried, and reported upon. The collected information is used in various decision-making processes in conjunction with budgets, county and local municipalities, other state and federal agencies, and the state legislature.

Challenges

Challenges specific to land information/GIS integration and modernization include:

- Developing data standards in an interagency, statewide context.
- Hiring, training and retaining specialized staff.
- Identifying and making available highly detailed local government GIS data. Even though more GIS data is available, data lack uniformity across the state. There are different data models, content, accuracy, timeliness, etc. of same feature type data.
- Land information holdings such as those described here are more easily available to DOT's GIS community than to CADD users.
- Despite the increasing availability of data, some data are simply not available. Some data are not available at all; some are not available statewide or in the area of interest. Some data are not "timely": some data are created once and are rarely, if ever, updated. Some time-sensitive data are not updated frequently enough for certain business applications.
- The cost to obtain licensed data (Example - Digital Wisconsin Wetlands Inventory, licensed data from some other government entities), the cost to develop data, and the lack of uniformity of data access across the state.
- Geospatial technologies are data intensive and at times can create a larger network infrastructure footprint than non-geospatial technologies.

II. The Five Technology Architectures

A. Applications Architecture

WisDOT uses the ESRI product line (the state standard) for all GIS-related applications including desktop as well as web-based applications. Applications development involving GIS follows the same policies and procedures as all other application development in WisDOT. This strategy allows WisDOT to leverage existing services with other IT support areas, provides consistency for project managers and developers that work in multiple environments, and reduces overhead associated with applications development.

In addition to the GIS product line, WisDOT-developed Computer Aided Engineering (CAE) applications may be useful for local governments developing comprehensive plans. Computer Aided Engineering (CAE) refers to the network of automated systems that are used by engineers and specialists to carry out highway design, plan and plat development, and construction functions.

Computer Aided Engineering (CAE) utilizes a suite of programs to collect and process survey information, develop plans for transportation facilities, and ultimately build those planned facilities. Specific tools include the American Association of State Highway and Transportation Officials (AASHTO) Survey Data Management System Collector and

Processor software (which have been developed with other states using the AASHTO joint development process); Trimble Geomatics Office (used to process data collected using GPS systems); Autodesk Civil 3D and CAiCE (software as well as an acronym for Computer Aided Civil Engineering) used for editing survey data, creating surface models, and designing new roadways and other facilities; Microstation (used for producing electronic drawings of plans); WISCON (software used for converting points between various coordinate systems and datums used in Wisconsin); Adobe Acrobat (used to format and publish facility plans to the web); and many other utilities for transferring, converting, and fixing data.

Major applications that use GIS technology and location data

Wisconsin Information System for Local Roads (WISLR) is a web-based GIS data management system that contains map, inventory and administrative data for 100,000 miles of local roads. All of Wisconsin's 1,922 local units of government will have access to WISLR for retrieval and updating of data. WISLR supports long-term planning and decision-making for improving the local road system. WISLR enables the use of a statewide GIS local road database for:

- Viewing and editing inventory data such as pavement condition rating, pavement width, pavement type, construction year, shoulder, curb, traffic and length information;
- Viewing and printing reports and maps; and
- Displaying data geographically (i.e. view data with its location).
- Based on recommendations provided by the Local Roads and Streets Council, the Legislature enacted §86.302(2), Wis. Stats., requiring municipalities and counties to submit pavement ratings to WisDOT on a biennial basis. This information will be stored in WISLR.

State Trunk Network Inventory uses WisDOT's Linear Reference System to collect, store, analyze and report on physical and administrative data about Wisconsin's 11,000+ miles of state trunk highways.

Financial Integrated Improvement Programming System (FIIPS) is the department's comprehensive system for the advance planning, short term planning and management of local and state trunk improvement programs (e.g. 3R, Majors, Bridge, Backbone Rehab, Local Highway & Bridge Assistance, TEA etc.). One of the primary products of FIIPS processing is an approved program of planned improvements for the Highway system.

Highway Access Management System (HAMS) brings together and automates most highway access related information held by WisDOT. This project improves WisDOT's highway access permit review processes, by integrating most of WisDOT's highway access-related information (e.g., location of driveway permits, controlled access sites, etc.). This information was primarily available only in hard copy format.

Transportation Utility Management System automates the process to identify and notify utilities that may potentially be impacted by highway construction projects by integrating utility service areas with highway construction project locations.

Photolog/GPS project ties WisDOT's Photolog images and indexes to WisDOT's corporate Location Referencing System (LRS). This allows data collected or stored with a Photolog reference, such as certain OIS data, to be integrated with other corporate data.

Oversize/Overweight permit system application links various systems that retrieve customer and vehicle information, evaluate time-related and physical restrictions, perform bridge structural analysis, and generates a route. The application interacts with separate databases to evaluate restrictions and incorporate customer information. It also includes an external executable program for verifying bridges on a route, and a GIS tool for route generation and display. The results consist of route and escort instructions, trip conditions, restricted bridges, and maps that are appended to the permit for the motor carrier's use during the trip. The application improves customer service because faster turnaround time on permit applications reduces costs for motor carriers. Permit application automation reduces WisDOT's workload. The application also increases public safety by delivering optimized routes as various datasets are integrated to verify restrictions on the routes.

Highway Performance Monitoring System (HPMS) is a Federal system that reflects the extent, condition, performance, use, and operating characteristics of the Nation's highways - a reporting requirement of state DOTs. WisDOT uses its Linear Reference System to integrate the various databases that are part of the yearly HPMS reporting requirements.

DTDView is an interactive Web GIS application that provides access to enterprise spatial data and links to documents associated with that data. It uses a map interface to do location based views and queries of data.

Railroad Crossing Information System (RCIS) is a comprehensive railroad crossing database tracking detailed physical and operational characteristics of Wisconsin railroad crossings. DOT staff can look up information by location, county, crossing ID, etc

B. Information Architecture

WisDOT's information architecture supports WisDOT's data management needs. It provides a Department-wide focus and direction for developing, accessing and managing WisDOT's data and information resources.

WisDOT collects and maintains massive amounts of operational data that is stored in many locations and formats, and at varying levels of accuracy and precision. Increased emphasis on decision support systems has made the integration of systems and the direct access to data a goal of WisDOT's IT and GIS functions.

In accordance with WisDOT IT policies, data shared beyond the workgroup level is considered departmental and should be modeled, documented and stored in the appropriate data base manager. The model should be included in the DOT Corporate Data Model. Among the goals of these policies are to eliminate redundant data stores and to design data that are shareable.

In the early 1990s an effort called the Location Control Management (LCM) Business Area Analysis identified location as an effective means to integrate data. LCM are the corporate policies, procedures and data implemented by WisDOT to locate, manage and integrate land information. Several data creation efforts resulted from this identification. By utilizing LCM data as a means to capture, store and maintain the location of features, multiple business datasets can be integrated and business data can be transformed between location reference methods.

At a statewide level, WisDOT acquires key GIS data from Federal, State, and local sources as needed to support WisDOT programs. Examples of this include natural resources program data from DNR, census data from the U.S. Census Bureau and digital orthographic imagery from the US Department of Agriculture. A statewide set of digital raster graphics (DRGs) was acquired from DNR in early 1998. Soils survey data (STATSGO and SSURGO) is obtained from the National Conservation Resource Service (NCRS). Data sets from the National Transportation Atlas Database USDOT/BTS) is also available. Federal geodetic control information has been obtained from USGS and automated; digital NGS data is acquired on an annual (CD-ROM) and daily (WWW) basis. These data are made widely available for in-house use within the GIS community.

At the Regional level, a variety of street centerline, engineering, planning, natural resource, geodetic control, PLSS, parcel, digital orthographic imagery, and other data are obtained from local governments for project-specific needs..

Computer Aided Engineering Data

Information created by WisDOT's Computer Aided Engineering (CAE) applications may be useful for local governments developing comprehensive plans. Computer Aided Engineering (CAE) refers to the network of automated systems that is used by engineers and specialists to carry out highway design, plan and plat development, and construction functions. For example, "e-plans" are stored in Adobe PDF format and are being made available to WisDOT engineers on a LAN server and to external customers on an Extranet web site. In addition, technical information related to the design and survey alignments, DTM surfaces, etc., are exchanged using the AASHTO SDMS and the LAND XML data formats.

WisDOT makes extensive use of an AASHTO data standard called SDMS (Survey Data Management System). This is a hierarchical ASCII data format that is used to pass engineering data between the various Computer Aided Engineering software systems we use. This AASHTO standard is detailed in a document titled "AASHTO SDMS Technical Data Guide 2000" which is available on the web at:

<http://www.aashtoware.org/Documents/SDMSTDG.pdf> and also on the CAE web pages

of the WisDOT DOTNET intranet. This standard is expected to eventually be replaced by the evolving LandXML data standard that is more universally accepted and supported, supports more types of engineering data, and is more compatible with Internet standards.

WisDOT defines data requirements via a document titled “Electronic Data Standards.” This document defines the data requirements when consultants submit contracted work to WisDOT and when WisDOT engineers archive project data. This process helps ensure consistency in the delivery of a final product. The focus of these standards is on project data that will later be used in survey, right-of-way plat development, design or construction.

Custodial Responsibilities

Data custodians are responsible for the management and monitoring of data (information), whether required by statutes or rules, federal laws or acts, missions or appointments. This role includes data collection and maintenance activities (updates, fixes), which will make data fit predetermined database properties with acceptable risks. Custodians have all privileges (CREATE, READ, UPDATE, DELETE) but may not need to create data for which they are ultimately responsible; they can rely on others to produce the data. This is why it is key that database requirements are known. This table lists WisDOT’s custodial responsibilities and the authority used to establish the dataset.

WisDOT Custodial Responsibilities	Authority
GIS-Transportation statewide base maps <i>Currently limited to the State Trunk Highway Network and State Trunk Rail Networks and Local Roadways</i>	Business need
Wisconsin High Accuracy Reference Network (HARN) <i>Physical network maintenance and technical assistance for WLIP densification projects.</i>	WisDOT/NGS/WLIB MOU
State Highway Map	§84.02 (5), Wis. Stats.
County Map Series	§84.02 (12), Wis. Stats.
City-Village-Town (CVT) Map Series	§86.302 (1), Wis. Stats.
Railroad Abandonment Maps	Business need
Official Airport Maps / Aeronautical Charts	Business need
Photolog of the State Trunk Highway System	Business need
Highway Statistics	Federal requirement; business need
General Transportation Aids	§86.30, Wis. Stats.
State Trunk Highway Improvement Program (Reports & Maps)	Wisc. Admin.Code, Trans 209
STH Roadways and Bridges Inventory	Wisc. Admin.Code, Trans 209

Pavement Information File (PIF)	Wisc. Admin.Code, Trans 209
Transportation Project Information	Business need
Property Deed / Plat Information	Business need
Communication Tower Information	§85.12, Wis. Stats.

Data sharing agreements

WisDOT makes information available and useable by complying with Wisconsin open records requirements. Linear (route-based) data tied to WisDOT's link/site data model is shared with external users by creating a geographic (point/line/polygon) representation of the data. Annual releases of GIS datasets (STH roadway chains, local roadway chains and railroad chains) are distributed upon request. The most current version of these data is available by contacting WisDOT program area data stewards and/or assigned GIS Data Broker. For additional information about WisDOT's data sharing agreements and who is party to them, see the "Organizational Architecture" section below.

Major Datasets

See Appendix A for a table consisting of major land information-related datasets developed, currently in use, or held by WisDOT. These datasets include only those datasets that provide either complete statewide coverage, or cover a majority of counties in a majority of Transportation Regions, and thus may prove useful to a majority of local jurisdictions in the state. There may be additional useful datasets available on a local or region-level basis.

Wisconsin Height Modernization Program

In 1991 Wisconsin was one of the first states to join with the National Geodetic Survey (NGS) to establish a High Accuracy Reference Network (HARN), using Global Positioning System (GPS) technology. The Wisconsin HARN contained 80 horizontal monuments, with spacing being a nominal 50 kilometers. Throughout that process WisDOT was able to use global positioning system (GPS) technology for horizontal positioning, but determining elevation (vertical position) required the use of conventional survey methods. In May 1998, building on the relationship with the NGS developed for the HARN, a pilot project was started to determine if WisDOT could obtain GPS-derived elevation (orthometric height) with sufficient accuracy for designing and building transportation projects. The pilot project was successfully completed in January 2000.

A comprehensive plan for the Wisconsin Height Modernization Program (WI-HMP) was then developed in coordination with the NGS to establish, in phases, a statewide geodetic survey control network to provide precise horizontal and vertical control data. The broad goals are three-fold:

- Decrease the cost of surveying for transportation projects
- Improve quality by increasing accuracy
- Improve the quality and access to elevation data for the wide range of non-transportation users of these data (e.g., floodplain mapping, precision farming, hydrology modeling, etc.)

This program has been funded with a combination of state funds, federal planning funds, and US Department of Commerce funds specifically earmarked for WI-HMP through the National Oceanic and Atmospheric Administration (NOAA), the parent agency for NGS. Specifically, the program will:

1. Improve the horizontal geodetic network throughout the state to a density of 6-8 kilometers (3-4 miles),
2. Provide geodetic level lines at 25-kilometer (15-mile) spacing across the state, and
3. Use GPS technology to transfer elevations from these level lines to the densified horizontal network. The result is a 3-D geodetic network with horizontal and vertical accuracies of 2 cm (0.07 ft) or better.

When completed, the WI-HMP will consist of over 9,000 surveyed, highly accurate monuments, 100-150 for each of the 72 counties in the state.

Metadata software

Metadata is “data about data.” It describes the content, quality, condition, and other characteristics of data. WisDOT has adopted the Federal Geographic Data Committee (FGDC) Content Standard for Digital Geospatial Metadata for GIS formatted data. ArcCatalog is used to create metadata for all ArcSDE data; while ArcCatalog and text-editors are used for other GIS formatted data.

Metadata for all other types of data will vary in structure and format. Corporate data in Oracle and DB2 have metadata stored in a Business Objects Metadata Repository, while metadata for all other data can be in almost any format including spreadsheet, word processing and ASCII text documents.

WisDOT metadata/land information available on the web:

Comprehensive Planning Data Matrix

An Excel spreadsheet for documenting land information and data specifically related to the development of local government’s comprehensive plan has been developed. The matrix “shell” is considered a shorten version of a FGDC metadata framework. WisDOT refers to this spreadsheet as the Comprehensive Plan Metadata Matrix. (available at <http://www.dot.wisconsin.gov/localgov/docs/compplan-metadata.xls>)

WisDOT’s Comprehensive Planning Metadata Matrix provides a clear way to categorize the department’s land information and data useful for the development of local comprehensive plans under §66.1001, Wis. Stats. The information about the data gathered in this matrix provides primarily state level datasets and information. Some data and mapping is conducted at the Transportation region level especially regarding specific state transportation projects located in communities within the region. The Comprehensive Plan Metadata Matrix information is organized by a series of information categories including: data type, transportation mode, date, contact information, and web site if available.

It should be noted that this matrix is not considered all-inclusive and is an ongoing process. For example, transportation project-related data and maps and location specific plans, such as corridor plans for certain highway segments, are available at the Region level. This Region level information is not only useful in local comprehensive planning efforts, but can be vital to long term, local transportation planning. For specific information and data developed at the region level, local governments are encouraged to coordinate with region staff on their comprehensive plan efforts. The region planning contacts can be found for each county and municipality within a certain county by visiting this web address: <http://www.dot.wisconsin.gov/localgov/land/contacts.htm>.

Land information and metadata available on-line:

State Trunk Network Roadway Chain

<http://www.sco.wisc.edu/wisclinc/index.php>

Rail Chain <http://www.sco.wisc.edu/wisclinc/index.php>

Trans 233 setback maps: <http://www.dot.wisconsin.gov/business/rules/trans233.htm>

Wisconsin County maps: <http://www.dot.wisconsin.gov/travel/maps/county.htm>

WISLR: <http://www.dot.wisconsin.gov/localgov/wislr/index.htm>

State Highway Plan: <http://www.dot.wisconsin.gov/projects/state/hwy2020.htm>

Airport System Plan: <http://www.dot.wisconsin.gov/projects/state/air2020.htm>

Bicycle Transportation Plan: <http://www.dot.wisconsin.gov/projects/state/bike2020.htm>

Pedestrian Policy Plan: <http://www.dot.wisconsin.gov/projects/state/ped2020.htm>

State Rail Plan: <http://www.dot.wisconsin.gov/projects/state/railplan.htm>

Transit plans: <http://www.dot.wisconsin.gov/projects/transit.htm>

General information about plans and projects:

<http://www.dot.wisconsin.gov/projects/index.htm>

In addition, numerous maps and WisDOT plans are posted at the WisDOT website for different construction projects, public safety and other purposes:

<http://www.dot.wisconsin.gov/>

Off-Line Metadata: Refer to Contact information in Appendix A of this Plan.

Future metadata plans

WisDOT has created a Corporate Metadata Repository in Business Objects and is investigating the integration of ArcSDE metadata (FGDC compliant) into the DOT Corporate Data Repository.

C. Technology Architecture

Hardware

WisDOT's GIS client machines are, with few exceptions, upgraded or replaced on cycle to meet or exceed the current hardware specifications provided by our GIS software vendor.

- Almost all GIS workstations run Windows XP.
- Most server side machines (coverage based spatial data, Web, and applications) run Windows2008 OS. (Notable exception is Oracle which runs on HPUNIX)

- Corporate business data utilized by WisDOT GIS resides on either mainframe DB2 or Oracle.
- Corporate GIS data resides in ArcSDE and Oracle. (WisDOT uses a 3-tier architecture where ArcSDE is on an application server separate from the Oracle server.)
- The Department has functioning Intranet and Extranet environments in place to support various GIS Web applications.

Software

The department uses the ESRI product line for all GIS-related applications, including desktop as well as web-based applications. Current significant geospatial software include:

- Desktop GIS software - ArcView Desktop, ArcInfo Desktop and ARCINFO Workstation
- Web Mapping software – ArcIMS with efforts underway to replace with ArcGIS server
- RDBMS - DB2 and Oracle (GIS data stored using ArcSDE in Oracle)
- CADD - Bentley MicroStation
- Highway Design - Currently CAiCE software with efforts underway to replace with AutoDesk Civil 3D
- GPS - (see “Global Positioning System and Total Station Field Tools” discussion below)

WisDOT will investigate the interface between ESRI server GIS technology and IBM WebSphere® Application Server, where WebSphere Portal Server is deployed. WisDOT plans on integrating ArcGIS Server 10.1 within the WebSphere 7.0 framework. Enterprise GIS solutions can then be provided using the Java™ 2 Enterprise Edition (J2EE™) application programming language.

Global Positioning System (GPS) and Total Station Field Tools

Trimble supplies most surveying tools used by WisDOT. These include the model 4000 SSI geodetic receivers for high accuracy GPS control surveys, the model 4800 RTK system with TSC1 data collectors and recently the new GNSS RTK system with TSC2 survey controllers for topography and secondary control surveys, and the GeoXH collectors with Terrasync that is replacing the model ProXRS resource grade system for less accurate GIS related surveys. The software that is currently used with these GPS hardware systems includes Trimble Geomatics Office version 1.63 and Pathfinder Office version 4.0 for the PC and Survey Controller version 11.32 for the TSC2 survey controllers. As the new CORS (continuously operating reference system) installations are completed, the users will be using the current RTK receivers as rovers and the CORS will act as the base receiver.

WisDOT uses mostly Geodimeter model 600 series total stations and many have been upgrade to fully robotic. New total stations being purchased to replace these Geodimeter systems are called Trimble S6 robotic total stations and like the RTK receivers, these

total stations are now controlled using the TSC2 survey controllers. . WisDOT has adopted the various Trimble survey controllers in lieu of the SDMS Collector; however, much of the processing of the survey data is still accomplished using the AASHTO SDMS Processor PC program along with Trimble Geomatics Office and an assortment of file transfer utilities.

D. Organizational Architecture

Information Technology is integral to the agency's business and receives direction and input from the entire organization. The Modal and GIS Production Support Unit manages the GIS component of IT at WisDOT. It is housed within the Bureau of Information Technology Services (BITS).

GIS-related training offered

WisDOT provides a variety of land information or GIS-related training and educational activities; they include training on Access, ArcView, Arc/Info, Survey Data Management System (SDMS) software, and others. In addition, the Modal and GIS Production Support Unit contracts with service providers for requested GIS training/continuing education.

Existing data sharing agreements

WisDOT has several signed memoranda of understanding/agreement related to data sharing, as well as other agreements, partnerships and collaborative efforts; they include:

- **Local Roads and Streets Council**
WisDOT sponsors this Council for purposes of reviewing and recommending improvements to local transportation data collection and management systems, and funding mechanisms. The Wisconsin Information System for Local Roads (WISLR) database is a major result of this sponsorship. WISLR is an ongoing cooperative effort that provides WisDOT and local governments convenient and secure access to comprehensive data on Wisconsin's 100,000-mile local roads network. The initiative is aimed at modernizing the database and mapping system for all local roads throughout Wisconsin.
- **National Geodetic Survey**
Since 1985, WisDOT and the National Geodetic Survey (NGS) have partnered in the State Geodetic Advisor program. Under a cooperative agreement, WisDOT provides partial funding for the fulltime Wisconsin State Geodetic Advisor whose office is at WisDOT headquarters. This position provides outreach, technical assistance, and training in support of a wide variety of land and geographic information activities throughout the State. In 1991 WisDOT and NGS established a High Accuracy Reference Network (HARN), using Global Positioning System (GPS) technology. The Wisconsin HARN contains 80 horizontal monuments, spaced approximately 50 kilometers apart. Continuing this effort to provide highly accurate geodetic controls, WisDOT and the NGS developed the Wisconsin Height Modernization Program (WI-HMP). When

completed, the WI-HMP will consist of over 9,000 surveyed, highly accurate monuments, 100-150 for each of the 72 counties in the state.

- FGDC/WisDOT/others
WisDOT participates in standards and framework data development for metadata and transportation data models, and geodetic, cadastral, and transportation framework data for the National Spatial Data Infrastructure (NSDI). Part of this effort includes the WI-HMP, mentioned above.
- EPA/WisDOT
WisDOT has a cooperative arrangement for hazardous materials (HAZMAT) data sharing.

E. Security Architecture

Legal disclaimer

WisDOT includes the following standard disclaimer as part of the metadata for the statewide GIS data layers:

The information contained in this data set was created for the official use of the Wisconsin Department of Transportation (WisDOT). Any other use while not prohibited, is the sole responsibility of the user. WisDOT expressly disclaims all liability regarding fitness of use of the information for other than official WisDOT business.

Open Records

WisDOT's Office of General Counsel recently (August 2003) updated its open records guidance. Generally, ALL information is a public record unless specifically designated otherwise by law. WisDOT will determine on a case-by-case basis whether there is a public policy reason to deny access to specific public records. Denial of access is an exception, not the rule.

Under the Open Records Law records are presumed to be open and subject to disclosure, unless a records custodian can establish a legitimate reason for non-disclosure. In making this decision, custodians must use the balancing test, consider recognized statutory or common law exceptions, and the presumption of disclosure.

The balancing test requires custodians to balance the public interest in disclosure against the public interest in non-disclosure. Custodians must consider the presumption of disclosure, and may consider a person's privacy interests when using the balancing test.

A public record is broadly defined. Public records include any handwritten, typed, printed or recorded document, regardless of the physical form. Examples include reports, memos, correspondence, e-mail, photographs, maps, video and audio tape recordings, the material used as input for a computer program, and the material produced from a computer program. Electronic records are public records.

In doing a balancing test analysis, it may be helpful for the custodian to imagine/envision a traditional scale already weighed down by the presumption in favor of access. When another public policy concern is placed on the scale, that other public policy must be sufficient enough to tip the scale. If there is no statute, no other legal prohibition against access or no competing public policy, then the law is absolutely clear, the information is presumed to be public information and must be released.

Cost Recovery

Wisconsin Statute allows WisDOT to charge reasonable copy and search fees. These fees may not exceed WisDOT's actual, necessary and direct costs. See Section 19.35(3), Wis. Stats. TAM 58 sets the usual copy fee at 25 cents per page. Search fees may be charged only if they exceed \$50. Prepayment may be required if copy or search fees will exceed \$5. WisDOT may waive or reduce copy and search fees, when it is in the public interest. WisDOT cannot charge state sales tax for copies or searches, and cannot charge for the cost of separating confidential information from non-confidential information (redaction).

Appendix A: Information Architecture

Please note: The “Source Producer” is the agency that originally produced the data. If the “Contact or Source Producer” column includes a name and phone number, it is WisDOT-produced data and WisDOT is the appropriate place to acquire that data. If the “Contact or Source Producer” column does not include a name and phone number, the agency listed is the appropriate contact from whom to acquire that data.

Name	Extent	Major Data Elements	Contact or Source Producer
National Transportation Atlas Database (NTAD)	Statewide	General transportation infrastructure data describing air, rail and waterway transportation including various transportation analysis zones.	USDOT
Legislative District Boundaries	Statewide	WI Assembly, State Senate and US Congressional boundaries	WIDOA
TIGER Line Files	Statewide	Various civil, administrative, and physical features that are created and used to support the US Census.	US Census Bureau
US Census Statistical Data	Statewide	Various statistical data from the 2000 US Census including travel to work, race, population, and income statistics.	US Census Bureau
Digital Raster Graphics (DRGs) - 7.5'	Statewide	Geo-referenced TIFF of 7.5' USGS Topographic Quadrangle maps	WIDNR
Elevation	Statewide	30 and 75 meter elevation data	USGS
Hydrography (1:24k scale)	Statewide	Surface hydrography	WIDNR
Digital orthophotos	Statewide	County-wide digital orthophotos compiled and distributed by the WIDNR from various years, scales and sources.	WIDNR
LANDNET (1:24k scale)	Statewide	Public Land Survey System (PLSS) data	WIDNR
Quadrangle Boundaries (7.5')	Statewide	7.5' quadrangle boundaries	WIDNR
Wisconsin Trails Database	Statewide	Trails that offer recreational opportunities	WIDNR
Trans 233 database	Statewide	Permit #, Contact info, legal description, Activity Log, Decisions	Region SPO Unit (See Contact Information below)
Land Division	Statewide	File and Sub #, Date Received and expiration date, Land Div type, Plat Name and Year Platted, Township and Range data, Owner and Surveyor data, Access data, comments	Region SPO Unit (See Region Contact Information below)

Access Restrictions	Statewide	ID, County, Owner's Name, Hwy, Location, Section, Town and Range	Region SPO (See Region Contact Information below)
Utility Permits	Statewide	Rec ID, County, Section, Town and Range, RP, Hwy, City, Street, Crossing, Method, Type, Date Permit #	Region Utility Coord. (See Region Contact Information below)
Revocable Occupancy Permit	Statewide	Project ID, File #, County, Name, Hwy, Location, Sec-Town-Range, Volume, Page, Purpose	Region SPO Unit (See Region Contact Information below)
Pending Encroachments	Statewide	County, Hwy., Sec-Twn-Range, Name, Project ID	Region SPO Unit (See Region Contact Information below)
Leases	Statewide	Rec #, Lease #, County, Contact Info, Project ID, Sec, Town Range, Lease Info, Description (READS)	Peg Hutnick (608) 266-2369
WisDOT Land Sales Information	Statewide	Information on available lands for purchase from WisDOT	Liz Orella (608) 266-0786
Highway Project Real Estate Acquisition Information	Statewide	Proj. ID, Parcel No., Property Owners Name, Area acquired, date acquired (READS).	Lynn Fiore (608) 267-9074
Culvert Log	Statewide	ID, Inspection date, rating, install date, dimensions, location, comments [varies by Region]	Region GIS Contact
State Trunk Network (STN) Road Centerlines	Statewide	1:100,000 scale representation of STN centerline geometry, with route names	Barb Jenkins 267-1228
State Trunk Network Inventory	Statewide	Physical and administrative information on Wisconsin's 11,000+ miles of state highways.	Scott Erdman 266-1010
Rail_Centerlines	Statewide	Displayable geometry with railroad names or WI rail lines	Tom Frackleton 264-7331
PIF (Pavement Information File)	Statewide (by region)	Pavement ride and condition	William Duckert 246-5440
NGS (NGS horizontal & vertical geodetic control info)	Statewide	Station position & description information (available on NGS website)	Glen Schaefer 266-8485
USGS vertical control info	Statewide	Station position and description information (Available on the Wisconsin State Cartographer Office's web site under Control Finder)	SCO

PHOTO-GRAMMETRY POINTS	Statewide	WisDOT aerial photo inventory; 1963 to present	WisDOT Surveying & Mapping
TRADAS (traffic system information)	Statewide	Traffic volumes, speed, classification, truck weight	Rhonda McDonald 266-8678
Wisconsin Information System for Local Roads (WISLR)	Statewide	Centerline geometry for 100,000+ miles of local roads stored/maintained in ArcSDE (Oracle); and business and administrative data (physical data, jurisdiction, etc.) that are maintained on the web and stored in Oracle. "http://www.dot.wisconsin.gov/localgov/wislr/index.htm"	Kelly Schieldt 267-9748
Indpark.shp	Statewide	Industrial & business parks by municipality, total acres	Liat Lichtman 267-3614

In addition to the data above, local governments and others may find E-Plans useful. E-Plans are electronic transportation facility construction plans in Adobe PDF format that are stored on a LAN server for access by engineers via the WisDOT intranet and for access by consultants for bidding via the WisDOT extranet.